SHORT COMMUNICATIONS

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PARATHION POISONING OF MISSISSIPPI KITES IN OKLAHOMA

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Parathion (phosphorothioic acid O, O-diethyl O-[*4*-nitrophenyl] ester) is a broad spectrum organophosphorus insecticide, used on a variety of crops and occasionally for mosquito control, and is highly toxic to birds (Smith 1987). Intentional poisoning with parathion is reported to have killed more than 8000 red-winged blackbirds (*Agelaius phoeniceus*), common grackles (*Quiscalus quiscula*), brown-headed cowbirds (*Molothrus ater*) and European starlings (*Sturnus vulgaris*) in two separate instances (Stone et al. 1984). Use of parathion on wheat fields has resulted in the mortality of about 1600 Canada geese (*Branta canadensis*) and other waterfowl in one instance (White et al. 1982) and about 200 Canada geese in another (Flickinger et al. 1991). More than 200 laughing gulls (*Larus atricilla*) died near cotton fields treated with parathion (White et al. 1979). Secondary poisoning of raptors, resulting from the consumption of prey exposed to parathion, has been reported experimentally and in the field. Stone et al. (1984) found two dead red-tailed hawks (*Buteo jamaicensis*), a Cooper's hawk (*Accipiter cooperii*) and an American kestrel (*Falco sparverius*) that had fed on blackbirds killed by parathion. One of four American kestrels died after being fed cricket frogs (*Acris crepitans*) that had been exposed to 10 ppm parathion for 96 hr (Fleming et al. 1982). The Mississippi kite (*Ictinia mississippiensis*) is highly insectivorous (Brown and Amadon 1968) and is thus subject to secondary poisoning resulting from consumption of insects exposed to pesticides. I report here an instance of secondary parathion poisoning in wild Mississippi kites.

STUDY AREA AND METHODS

On 25 August 1988, two sick and 14 dead Mississippi kites were collected at the edge of a golf course near Altus in southwest Oklahoma. One owl, two rabbits, and several ground squirrels, all of unidentified species, were also found dead in proximity to the kites but were not examined. Adjacent to the golf course were cotton fields recently sprayed with pesticides and, although inquiries were made, the specific compound(s) used remain unknown. There was no history of recent pesticide application to the golf course. Three of the dead kites were sent to the National Wildlife Health Research Center for necropsy. Brains from these three carcasses, and from one bird collected as a control by shooting, were tested for cholinesterase activity by the method of Ellman et al. (1961) as modified by Hill and Fleming (1982). Stomach contents were pooled from the three birds found dead and sent to the Patuxent Wildlife Research Center and analyzed by column extraction and gas chromatography for 24 organophosphorus compounds and six carbamates (Belisle and Swineford 1988, Patuxent Analytical Control Facility standard operating procedure 0-25.00). The lower limit of reportable residues was 0.1 ppm wet weight for organophosphorus compounds and 2.45–4.90 ppm wet weight for carbamates.

RESULTS AND DISCUSSION

Clinical signs exhibited by the two sick birds included frothy oral discharge, weakness, inability to stand, and stumbling gait—all compatible with exposure to an anticholinesterase agent (Grue et al. 1991). These birds recovered after being given ground beef and water. Examination of the three carcasses revealed that two were adult females and the third was a male of undetermined age. All three were in fair body condition with only traces of subcutaneous fat, had large amounts of unidentified insect remains in their stomachs, and no lesions suggestive of trauma or infectious disease. Brain cholinesterase activities in the three birds found dead were 1.0–1.1 μmol/min/g (wet weight), compared with 9.2 μmol/min/g (wet weight) for the control bird. These results suggested death was due to an anticholinesterase pesticide (Ludke et al. 1975) and incubation of the sample for 18 hr at 37°C resulted in no increase of brain cholinesterase activity, implicating an organophosphorus compound (Hill and Fleming 1982). Parathion (0.69 ppm wet weight) was the only pesticide found in detectable levels in the sample of pooled stomach contents, and its presence in the sample was confirmed by gas chromatography/mass spectroscopy.

The history of recent pesticide application to adjacent cotton fields, the proximity of sick Mississippi kites ex-

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hibiting clinical signs compatible with anticholinesterase poisoning, and laboratory findings in kites found dead point to parathion as the cause of mortality in this event. The presence of insect remains and parathion in the stomachs of these birds suggest they were secondarily poisoned after consuming insects exposed to parathion, probably applied to cotton fields adjacent to the golf course. This is the first documentation of Mississippi kites dying of anticholinesterase poisoning and parallels a case in south Texas where laughing gulls died after feeding on insects in cotton fields recently sprayed with parathion (White et al. 1979).

RESUMEN.—El 25 de agosto de 1988 se encontraron dos individuos enfermos de *Ictinia mississippiensis* y 14 individuos muertos, en el campo de golf Altus, Oklahoma. Las señales clínicas observadas sugirieron un envenenamiento por anticolinesterasa. Se diagnosticó un envenenamiento por "parathion," luego que la evaluación de laboratorio reveló inhibición de colinesterasa cerebral de un 88–89% y la presencia de "parathion" (0.69 ppm, peso húmedo), en el contenido estomacal. Cultivos de algodón adyacentes al campo de golf habían sido recientemente rociados con un (os) pesticida (s) desconocido (s). No hubo antecedentes recientes de aplicación de pesticidas al campo de golf. El contenido estomacal consistió en restos de insectos y es probable que los individuos de *I. mississippiensis* se hayan envevenado secundariamente, luego de consumir insectos expuestos a la aplicación de "parathion" en los campos de algodón.

[Traducción de Ivan Lazo]

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